

ACE Workshop - Introduction



ACE Science Working Group

- Hard eyed look at the ACE Decadal Survey Mission and the perspectives on which it was based
- Start with the mission as described in the Decadal Survey
 - Any changes will have to be justified rigorously (e.g., OSSEs)
 - Cost is a very significant issue - we need to work to reduce costs and justify any increases
- Interdisciplinary / Collaborative Nature of ACE
 - Sensors
 - Retrievals
 - Science
 - Monitoring





Decadal Survey Mission	Mission Description	Orbit	Instruments	Rough Cost Estimate
Timeframe 2010 – 2013, Missions listed by cost				
CLARREO (NASA portion)	Solar and Earth radiation, spectrally resolved forcing and response of the climate system	LEO, Precessing	Absolute, spectrally-resolved interferometer	\$200 M
SMAP	Soil moisture and freeze/thaw for weather and water cycle processes	LEO, SSO	L-band radar L-band radiometer	\$300 M
ICESat-II	Ice sheet height changes for climate change diagnosis	LEO, Non-SSO	Laser altimeter	\$300 M
DESDynI	Surface and ice sheet deformation for understanding natural hazards and climate; vegetation structure for ecosystem health	LEO, SSO	L-band InSAR Laser altimeter	\$700 M
Timeframe: 2013 – 2016, Missions listed by cost				
HypIRI	Land surface composition for agriculture and mineral characterization; vegetation types for ecosystem health	LEO, SSO	Hyperspectral spectrometer	\$300 M
ASCENDS	Day/night, all-latitude, all-season CO ₂ column integrals for climate emissions	LEO, SSO	Multifrequency laser	\$400 M
SWOT	Ocean, lake, and river water levels for ocean and inland water dynamics	LEO, SSO	Ka-band wide swath radar C-band radar	\$450 M
GEO-CAPE	Atmospheric gas columns for air quality forecasts; ocean color for coastal ecosystem health and climate emissions	GEO	High and low spatial resolution hyperspectral imagers	\$550 M
ACE	Aerosol and cloud profiles for climate and water cycle; ocean color for open ocean biogeochemistry	LEO, SSO	Backscatter lidar Multiangle polarimeter Doppler radar	\$800 M
Timeframe: 2016 -2020, Missions listed by cost				
LIST	Land surface topography for landslide hazards and water runoff	LEO, SSO	Laser altimeter	\$300 M
PATH	High frequency, all-weather temperature and humidity soundings for weather forecasting and SST ^o	GEO	MW array spectrometer	\$450 M
GRACE-II	High temporal resolution gravity fields for tracking large-scale water movement	LEO, SSO	Microwave or laser ranging system	\$450 M
SCLP	Snow accumulation for fresh water availability	LEO, SSO	Ku and X-band radars K and Ka-band radiometers	\$500 M
GACM	Ozone and related gases for intercontinental air quality and stratospheric ozone layer prediction	LEO, SSO	UV spectrometer IR spectrometer Microwave limb sounder	\$600 M
3D-Winds (Demo)	Tropospheric winds for weather forecasting and pollution transport	LEO, SSO	Doppler lidar	\$650 M

Tier 1

Tier 2

Tier 3

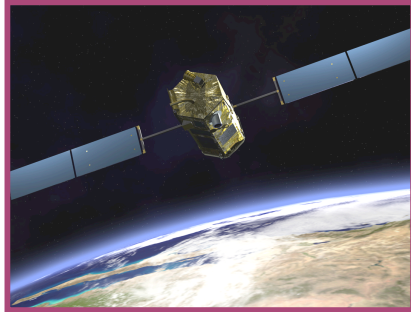




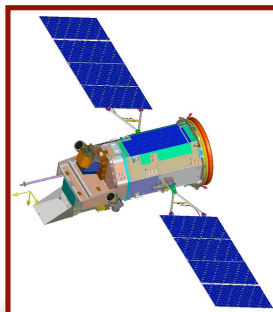
Missions in Formulation and Implementation



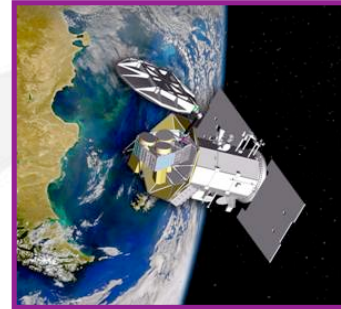
OSTM
6/2008



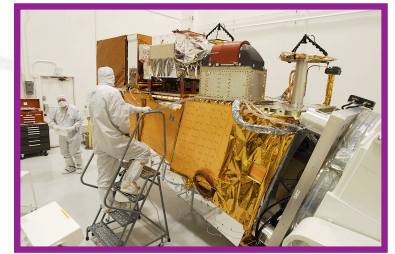
OCO
1/2009



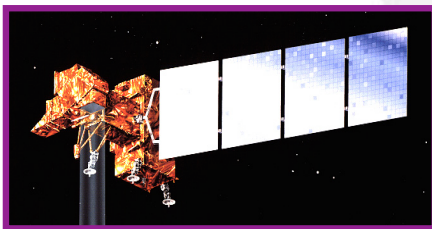
GLORY
6/2009



AQUARIUS
5/2010



NPP
6/2010



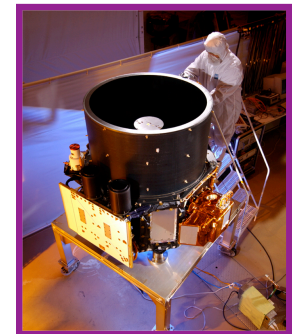
LDCM
7/2011



SMAP
2012

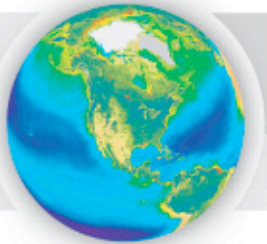


GPM
6/2013, 11/2014



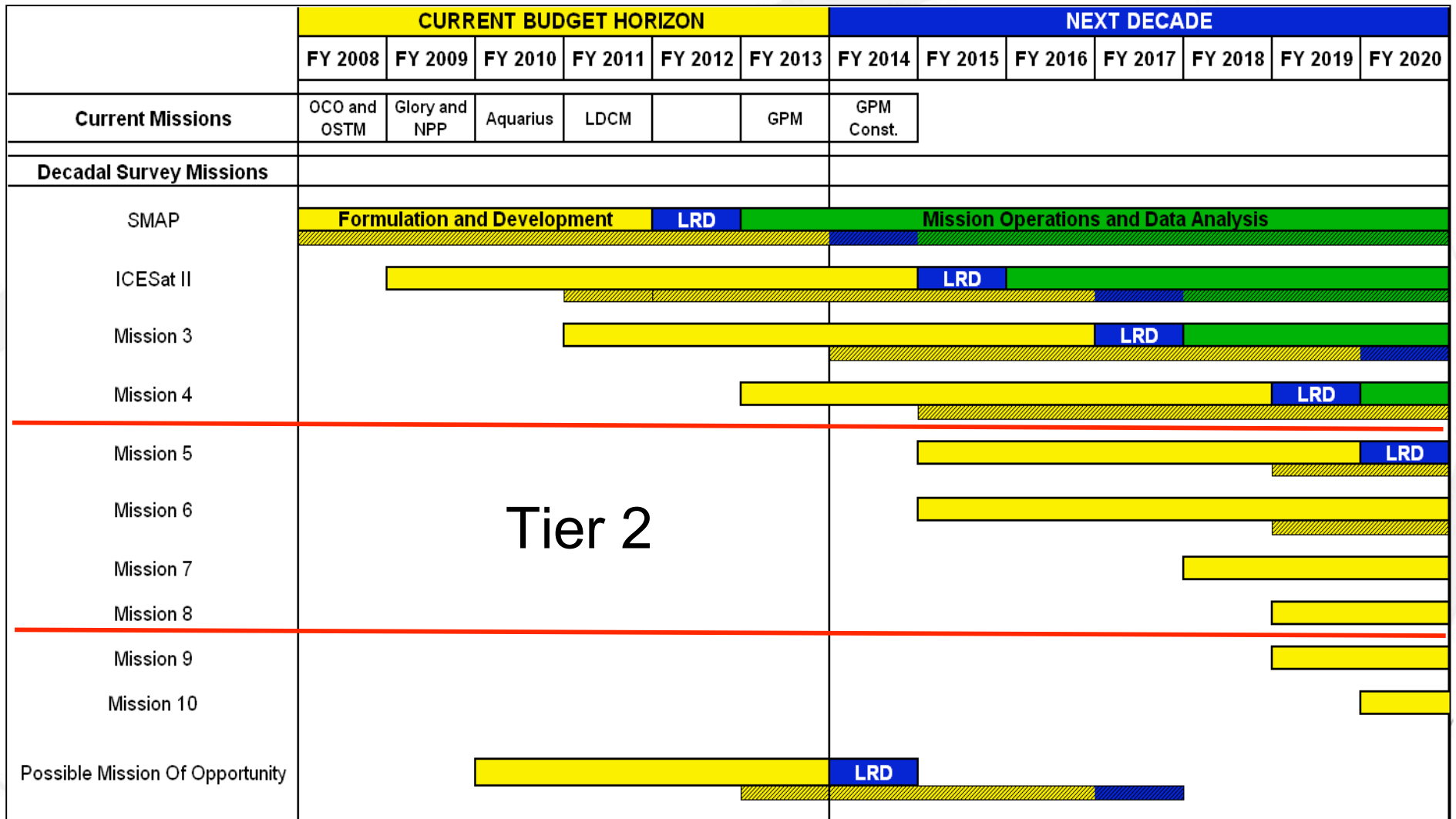
ICESat-II
2015

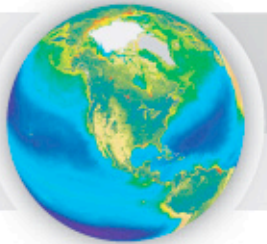




Earth Science New Initiative

NEW vs. PREVIOUS (hatched) MISSION PROFILE



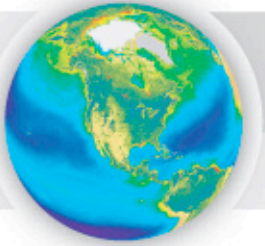


ACE SWG Structure

ACE Science Working Group

Sub-Teams	Name	Sub-Teams	Name
Management		Clouds	
HQ	Maring, Hal Bontempi, Paula Freidl, Lawrence Neeck, Steve	Theory/Modeler	Jensen, Eric Stephens, Graeme Feingold, Graham Wu, Dong Marchand, Roger Hou, Arthur
Science Lead	McClain, Chuck Schoeberl, Mark		
Coordinator	Vane, Deb	Retrievals	Ackerman, Steve Platnick, Steve Mace, Jay Haddad, Ziad
HQ Program Office	DiJoseph, Mary		
ESTO	Smith, Bob	Radar	Im, Eastwood Heymsfield, Gerry Racette, Paul Durden, Steve Tanelli, Simone
Ocean Biogeochemistry		Aerosols	
Theory/Modeler	Behrenfeld, Mike Boss, Emmanuel Follows, Mick Siegel, Dave	Theory/Modeler	Colarco, Pete Nenes, Thanos Toon, Brian Westphal, Doug
Retrievals	Ahmad, Zia Wang, Menghua Gordon, Howard Arnone, Bob	Retrievals	Remer, Lorraine Mishchenko, Michael Kahn, Ralph Hu, Yong
OC Spectrometer	Smith, Jay Waluschka, Gene Wilson, Mark Kotecki, Carl Meister, Gerhard Holmes, Alan Brown, Steve	Polarimeter/Imager	Diner, David Martins, Vanderlei Cairns, Brian
Cal/Val	Hooker, Stan	Lidar	Welton, Judd Hostetler, Chris McGill, Matt Wright, C. Wayne
Radiation	Loeb, Norm Kato, Sejii Pilewskie, Peter		
Mission Design	Devito, Dan Boland, Stacey	Cal/Val	Starr, David Redemann, Jens





Tone of Study



■ Synergies

- Interdisciplinary: how do we inform the communities (aerosol, cloud, precipitation, ocean biology and biogeochemistry) and work together to strengthen scientific objectives and mission rationale

■ Tier II DS Mission



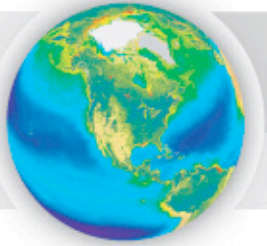


Goals of Workshop



- **Science Rationale for Mission – Interdisciplinary Nature of Science**
- **Science Questions → Measurements → Observational Requirements**
- **Discussion of potential international synergies on science**
- **Establish study groups**
 - **schedule for discussion/telecons/workshops**
 - **define tasks for study groups**
(OSSEs, Team X/IMDC, instrument studies/ISALs, etc.)





Workshop Agenda 1



1. Introduction (Hal Maring & Paula Bontempi)
2. Description of ACE in Decadal Survey (Mark Schoeberl)
3. Introduction to Earth Science Program Office (Mary DiJoseph)
4. Future Needs in Climate Modeling
 - a. Mick Follows (ocean biogeochemistry)
 - b. Pete Colarco (aerosols)
 - c. Tony DelGenio (clouds)
 - d. Ann Fridlind (aerosol – cloud interactions)
5. Review, Prioritization and Possible Refinement of STM
 - a. Lorraine Remer (Aerosols)
 - b. Mike Behrenfeld (Biogeochemistry)
 - c. Jay Mace (Clouds)
6. Introductory Talk(s) on Aerosol Retrievals
 - a. Passive nadir and multi-angle (Ralph Kahn)
 - b. Polarimetric (Brian Cairns)
 - c. UV (Omar Torres)
 - d. Lidar (Chris Hostetler)





Workshop Agenda 2



7. Introductory Talk on Ocean Color Retrievals (Chuck McClain)
8. Introductory Talk on Cloud & Precip Retrievals
 - a. Passive (Steve Platnick)
 - b. Radar (Graeme Stephens)
9. What is needed to maximize ACE science?
 - a. Connection to GPM (Arthur Hou)
 - b. Connection to Earth Radiation Budget (Norm Loeb)
 - c. IR and μ -wave instruments (Dave Starr)
 - d. What instrument characteristics do we need thinking 10 years into the future? (Mark Schoeberl)
10. What next? Studies, Collaborators, and Meetings. (Mark Schoeberl and Chuck McClain)
 - a. Multi-beam lidar OSSE (atmosphere and ocean)
 - b. Orbit
 - c. HSRL OSSE (atmosphere and ocean)
 - d. Scanning Radar OSSE
 - e. Aerosols and Ocean Color from one instrument?
 - f. International Collaboration
 - g. Follow up meeting(s) with participants, foreign collaborators, and private sector instrument makers.

